STRUCTURE OF MICROCARD

A01/1 = Structure of microcard

A02/1 = Special features, test specifications, tightening torques, general instructions

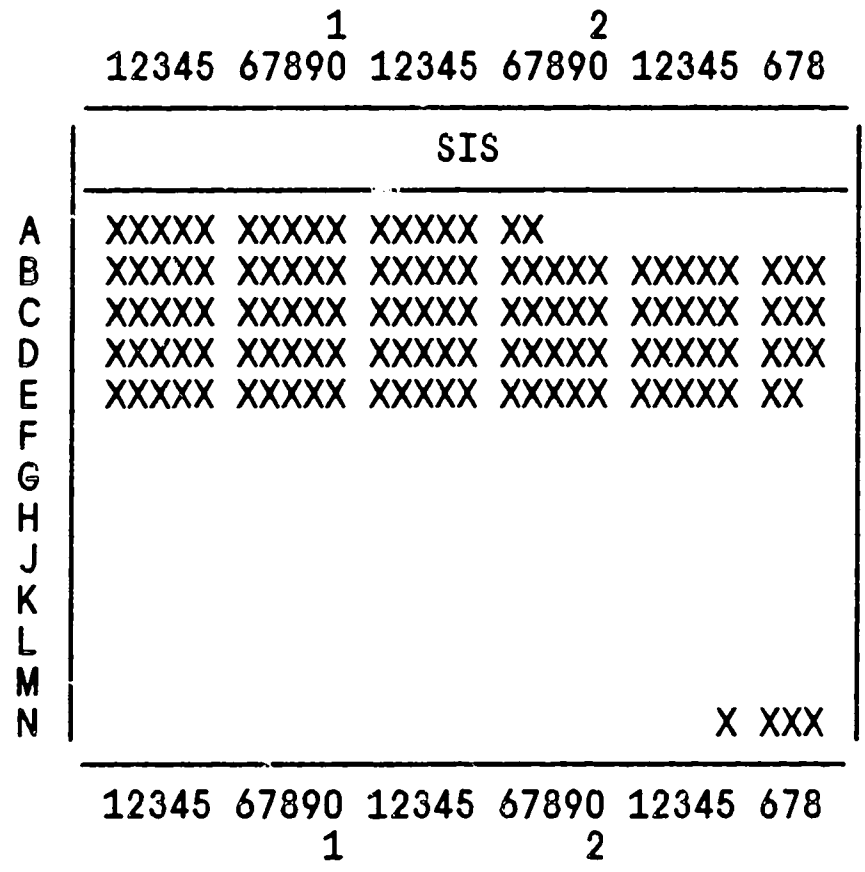
A07/2 = Test equipment

A12/2 = Testing and adjustment of pump

N27/1 = Table of contents

N28/1 = Editorial note

Continue: A02/1 Fig.: A01/2



Continue: A02/1

SPECIAL FEATURES

These instructions deal with the testing and adjustment of size PFR 1 K.. fuel-injection pumps with mark on housing flange on Bosch injection-pump test benches.

Continue: A02/2

TEST SPECIFICATIONS

The test specifications for size PFR 1 K.. fuel-injection pumps are given in the test specifications on microcard WP-100 (table of contents WP-00 or WP-01).

Continue: A03/1

TIGHTENING TORQUES

Screws, nuts etc. are itemized on drawing of PFR 1 K.. pump on Coordinates A..

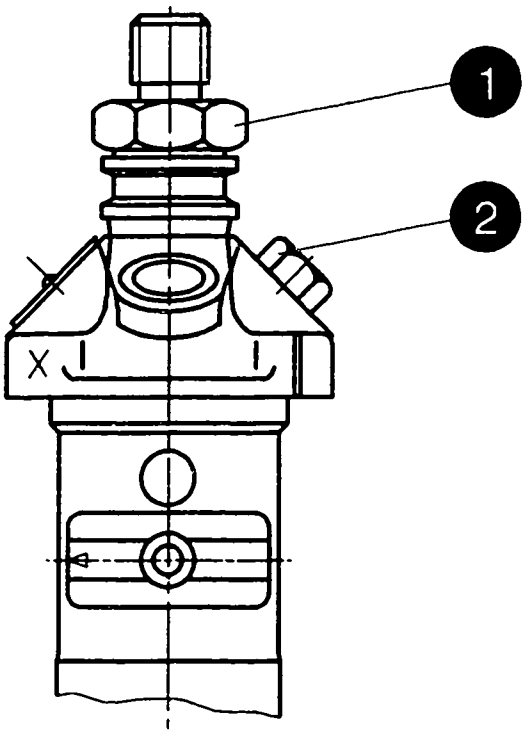
These items are repeated beneath the drawings and an indication is given of the Coordinates under which the tightening torque can be found.

Continue: A04/1

TIGHTENING TORQUES FOR PFR 1 K.. pumps

Items	Coordinate
1	
2	

Continue: A05/1 Fig.: A04/2



KMK01493

TIGHTENING TORQUES

Item 1 -
Delivery-valve holder 45-0-45-0-45+5 Nm

Item 2 -
Screw plug 20...30 Nm

Continue: A05/2

GENERAL INSTRUCTIONS
FOR TESTING FUEL-INJECTION PUMPS

Notes

The test instructions contain all important specifications and instructions which have to be heeded when adjusting size PFR 1 K.. in-line pumps.

The sequence of operations described corresponds to the tested sequence.

Specified control-rod travels are set and measured with the appropriate control-rod-travel measuring device.

Continue: A06/1

The zero position of the dial indicator generally refers to the blocked position of the control rod in center position.

Control-rod travels with a "+" sign signify a control-rod shift in the direction of more delivery.

Delivery check values are given in brackets.

These values only apply to the checking of a pump in it's as-delivered condition. They are never to be used for re-adjustment of a pump.

Continue: A06/2

CALIBRATING OIL

The calibrating oil must be in line with ISO Standard 4113.

It is not to be mixed with lubricating oil or diesel fuel, or contaminated with the above, as this would influence the test specifications.

It is likewise forbidden to mix ISO calibrating oils from various manufacturers or to add gasoline/diesel fuel to calibrating oils.

The prescribed calibrating-oil temperature is 38...42 Grad C in the inlet.

Continue: A07/1

Viscosity test:

Pay attention to viscosity-testing instructions from W 400/000 under "ISO calibrating oil, viscosity test".

Continue: A07/2

TEST EQUIPMENT

General

The settings and check values given in the test specifications refer to precisely defined test equipment which is mandatory for each pump.

The most important components of the test equipment are as follows: calibrating nozzle-holder assembly, test-pressure line and overflow valve.

Possible test-equipment variants are listed in the following.

Continue: A08/1

The first-indicated test-pressure line and calibrating nozzle-holder assembly represent the standard test equipment for PFR 1 K.. pumps.

Test-equipment variants are indicated below.

The test equipment also features a list of test-bench types approved for use with PFR 1 K.. pumps.

Non-observance of this specification will lead to major errors in terms of adjustment/incorrect test results. Non-indicated test-bench types are not permitted!

Continue: A08/2

CONDITION OF TEST EQUIPMENT

Check injection pressure of calibrating nozzle-holder assemblies and condition of nipples of test-pressure lines (use cylindrical gauge) once a week, however at the latest after testing 20 fuel-injection pumps!

If necessary, adjust opening pressure of calibrating nozzle-holder assemblies and repair/renew test-pressure lines.

Continue: A09/1

TEST CONDITIONS

In order to be able to obtain the prescribed values for pump adjustment or pump checking, precise attention is to be paid to the test conditions outlined in the test specifications.

This applies in particular to the inlet pressure and, where specified, a special restrictor at the fuel inlet and/or return.

Continue: A09/2

DELIVERY MEASUREMENT

+ Moisten inside of graduates prior to commencement of each measurement. To do so, pour in calibrating oil and allow graduates to drip off for 30 +/- 1 s.

+ Before starting next measurement, drain off graduates for 30 +/- 1 s upon completing measurement procedure. Moisten graduates again if interval following draining-off is longer than 10 minutes.

Continue: A10/1

+ The heating coil is not to be switched on when performing measurements.
  When reading off the delivery, there must be no bubbles in the graduates on the surface of the calibrating oil.
  Take reading at optical refraction at blue graduate strip.

+ The calibrating-oil temperature of 38...42 Grad C ist to be kept constant within the indicated tolerance during pump measurement.

Continue: A11/1

TEST-BENCH ACCESSORIES

For clamping/operation:	
Driving device	1 688 100 078
For measurement:	
Dial-indicator holder	1 680 390 003
Dial indicator	1 687 233 015
Magnet	1 686 540 013
For testing:	
Calibrating nozzle-holder assembly	1 681 343 009
Calibrating nozzle-holder assembly	1 688 901 025
Calibrating nozzle-holder assembly	1 688 901 027

Continue: A11/2

Test-bench accessories (continued)

Calibrating nozzle-holder assembly, no leakage fuel	1 688 901 031
Mounting platform	KDEP 1140
Test-pressure line	1 680 750 014
Test-pressure line	1 680 750 081
Test-pressure line	1 680 750 082
Inlet restrictor	1 683 458 023
Return restrictors	
Diameter 1.5 mm	1 683 456 018
Diameter 1.0 mm	1 683 456 019
For sealing:	
Sealing mandrel	KDEP 1636

Continue: A12/1

The tools, drive components and clamping parts described in these instructions must be used to avoid the possibility of accidents.

If they are not used, there is also a danger of damaging the fuel-injection pump and incorrect settings cannot be precluded.

Continue: A12/2

TESTING AND ADJUSTMENT OF PUMP

Preparation of injection-pump test bench

Fuel-injection pumps are only to be tested on the test bench with accessories approved for use with the respective pump.

The calibrating nozzle-holder assemblies prescribed for adjustment of the corresponding pump, the test-pressure line, the suction-gallery pressure and the overflow valve/restrictor are indicated in the test specifications/overview in W-400/000.

Continue: A13/1

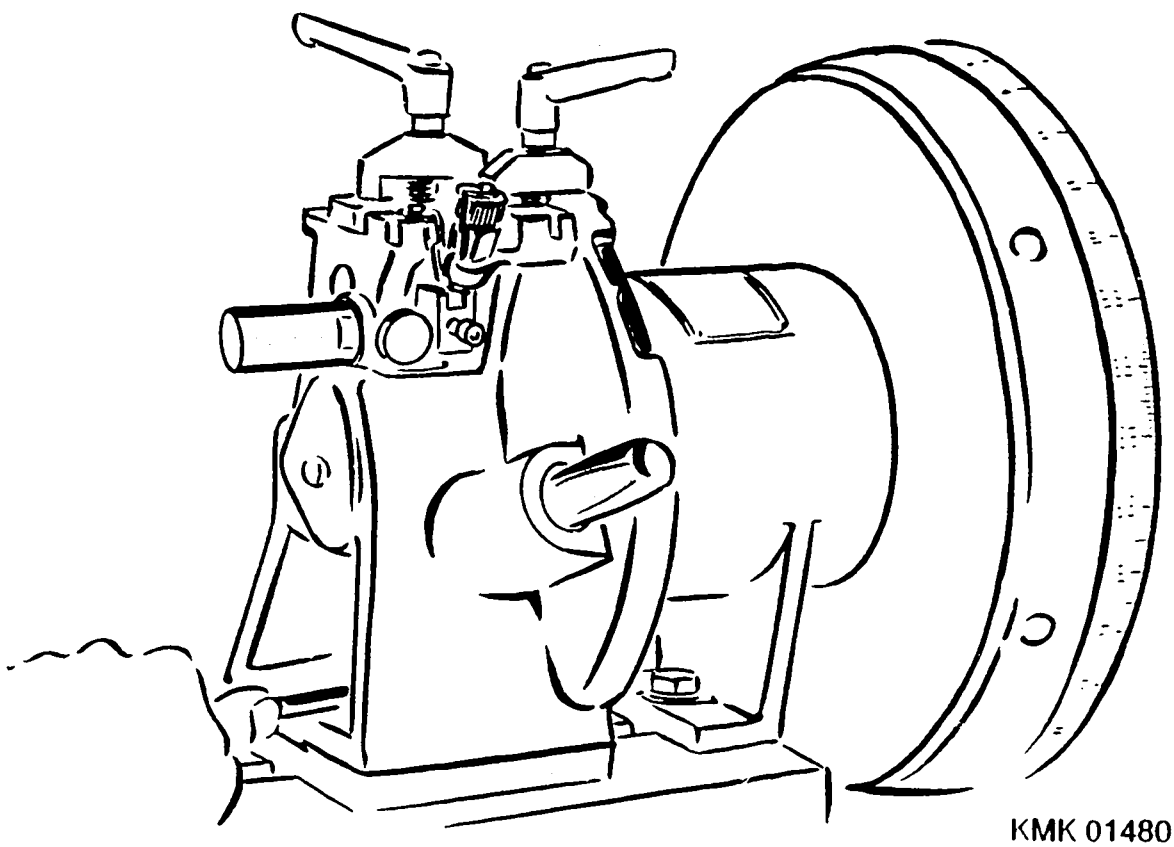
The calibrating oil must comply with the specifications relating to its test-bench applicability (particularly as regards viscosity).

Select and fit/place in readiness the connection parts (inlet union and inlet-union screw/restrictor) appropriate to the connecting thread of the fuel-injection pump and supply hose of the pump test bench.

Continue: A14/1

Clamp driving device 1 688 100 078
in position on test bench.

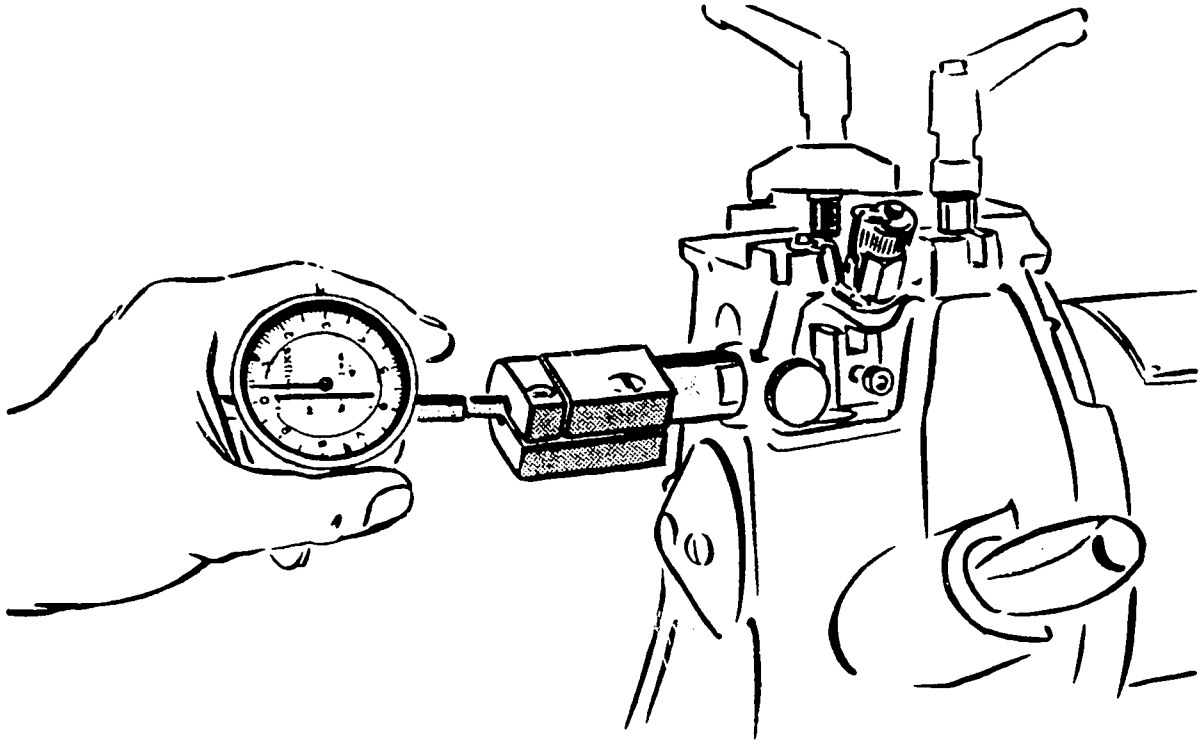
Continue: A15/1 Fig.: A14/2



KMK 01480

Attach dial-indicator holder and insert	1 680 390 003
control-rod-travel dial indicator with screwed-in magnet.	1 687 233 015 1 686 540 013

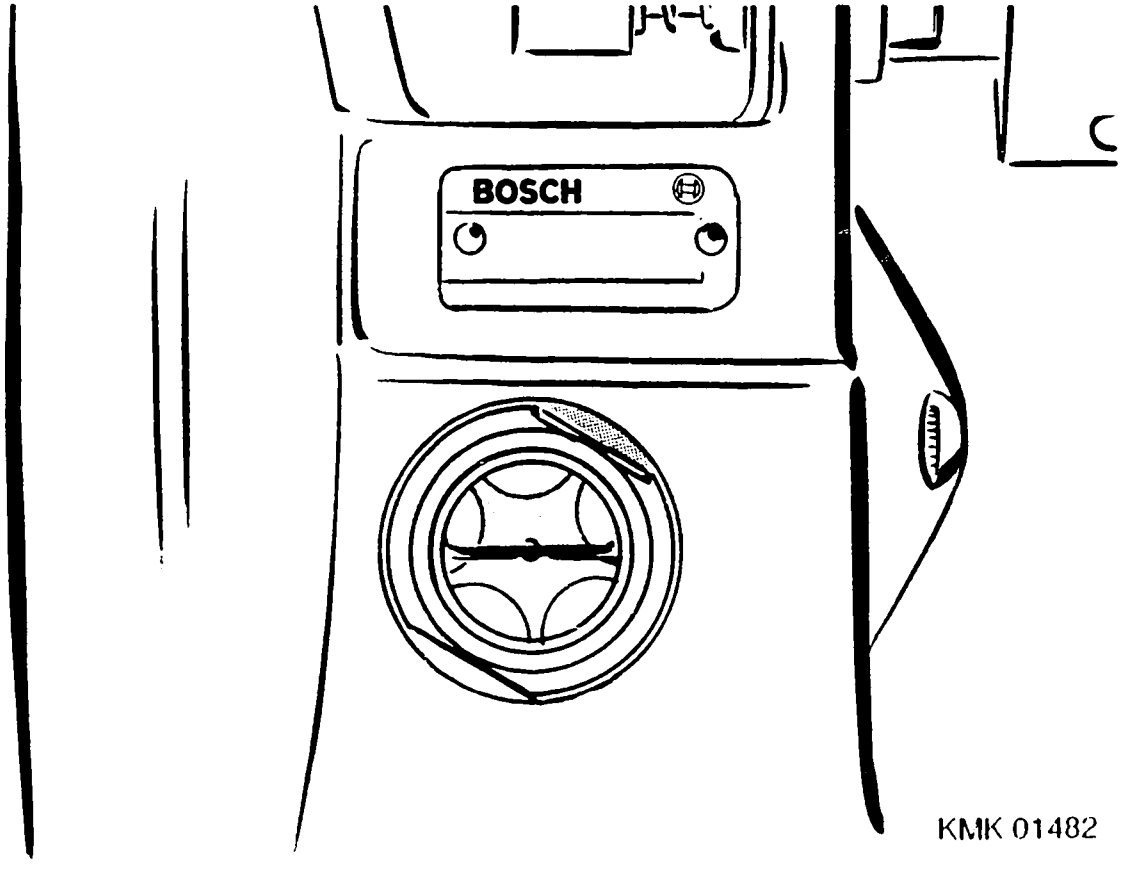
Continue: A16/1 Fig.: A15/2



KMK 01481

Pour lubricating oil (e.g. HD 30) into the driving device until the oil reaches the center of the sight glass on the back of the driving device.

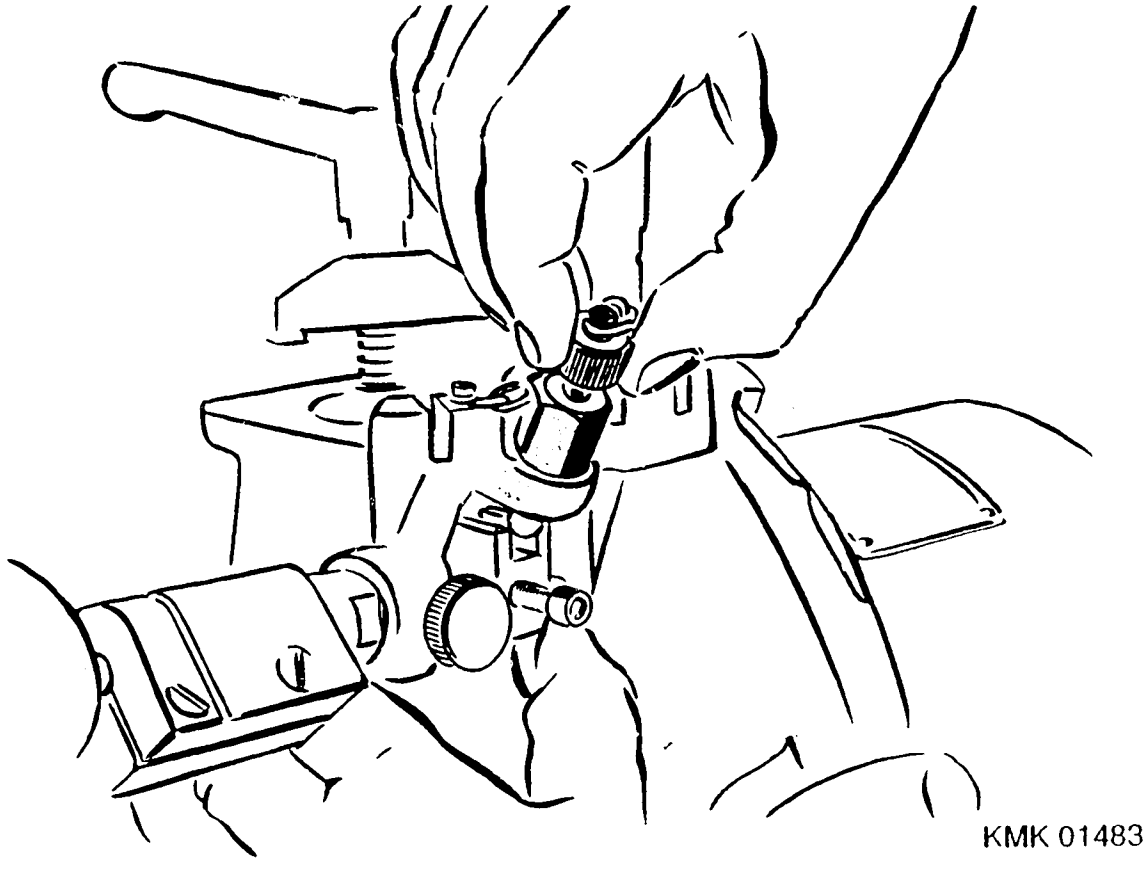
Continue: A17/1 Fig.: A16/2



Move control rod of driving device in direction of dial indicator until adjusting pin can be inserted into recess in control rod.

In this position, the control-rod-travel dial indicator is set to "0" with 10 mm.

Continue: A18/1 Fig.: A17/2

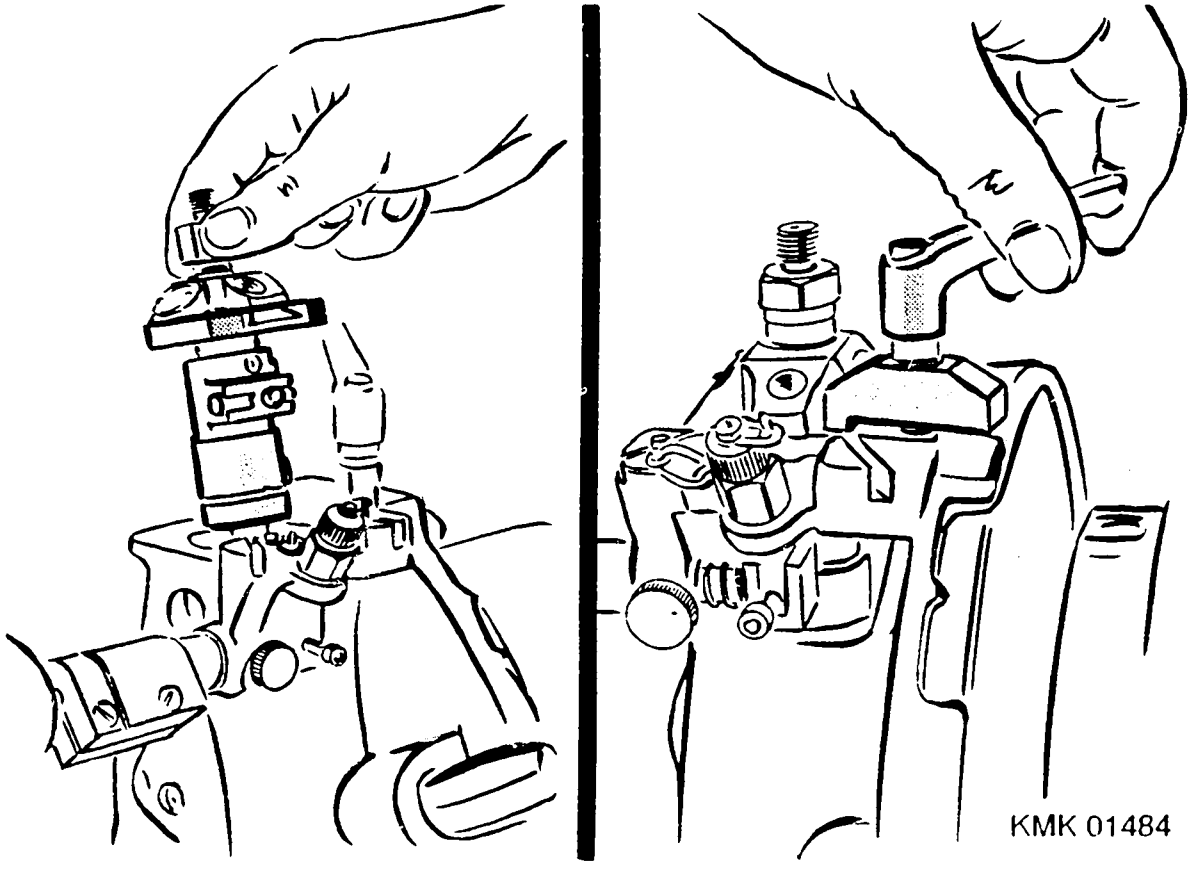


KMK 01483

Adjustment of fuel-injection pump

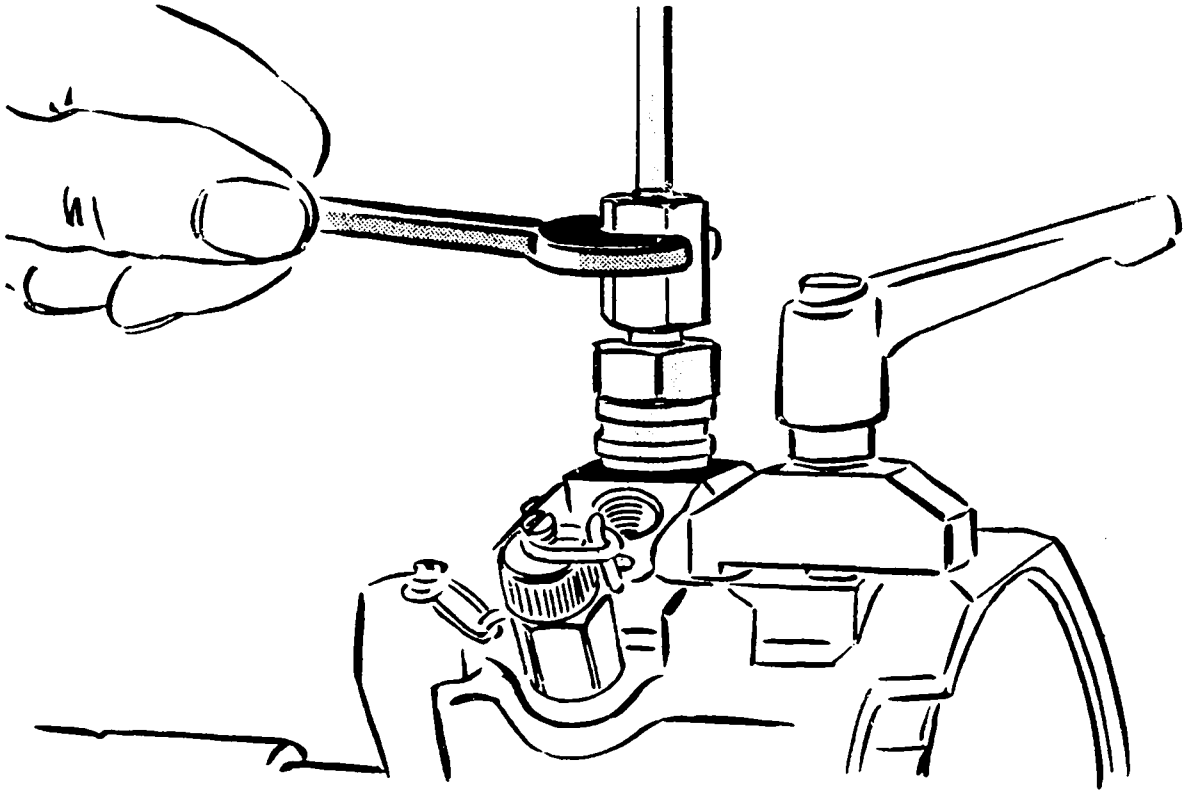
Insert fuel-injection pump from top into driving device 1 688 100 078.
Use is not to be made of any prestroke shims.
When the roller of the roller tappet makes contact with the drive-shaft cam, the fuel-injection pump is still not in contact with the mounting surface.
For this reason, continue pressing the fuel-injection pump downwards by hand until it makes contact with the driving device.
Place locking claws in position at fuel-injection pump and tighten.

Continue: A19/1 Fig.: A18/2



Screw prescribed test-pressure line to fuel-injection pump.

Continue: A20/1 Fig.: A19/2



KMK 01485

Assemble test-pressure lines vertically on delivery-valve holder and calibrating nozzle-holder assembly.

The connecting nipple of the test-pressure line may be damaged in the event of non-observance of the above.

A damaged connecting nipple can cause calibrating oil to emerge at high pressure and thus result in injuries.

Continue: A20/2

Kinked test-pressure lines, test-pressure lines damaged at the connecting-nipple sealing surfaces and test-pressure lines with impermissible bending radii are to be replaced (refer to W-400/000: test benches, test equipment and instructions for testing fuel-injection pumps).

Adjustment errors will result if damaged test-pressure lines are used for test purposes.

A damaged line can result in calibrating oil emerging at high pressure and may lead to injury.

Continue: A21/1

Connect up calibrating-oil inlet at fuel-injection pump.
Make use of prescribed restrictor(s) where appropriate.
Seal off return hole with dummy plug so as to be pressure-tight.
Open overflow screw at calibrating nozzle-holder assembly for adjustment of prestroke.
Switch on pump test bench and increase high pressure of calibrating oil until it emerges at overflow pipe of calibrating nozzle-holder assembly or until the pressure prescribed in the test specifications is attained.

Continue: A22/1

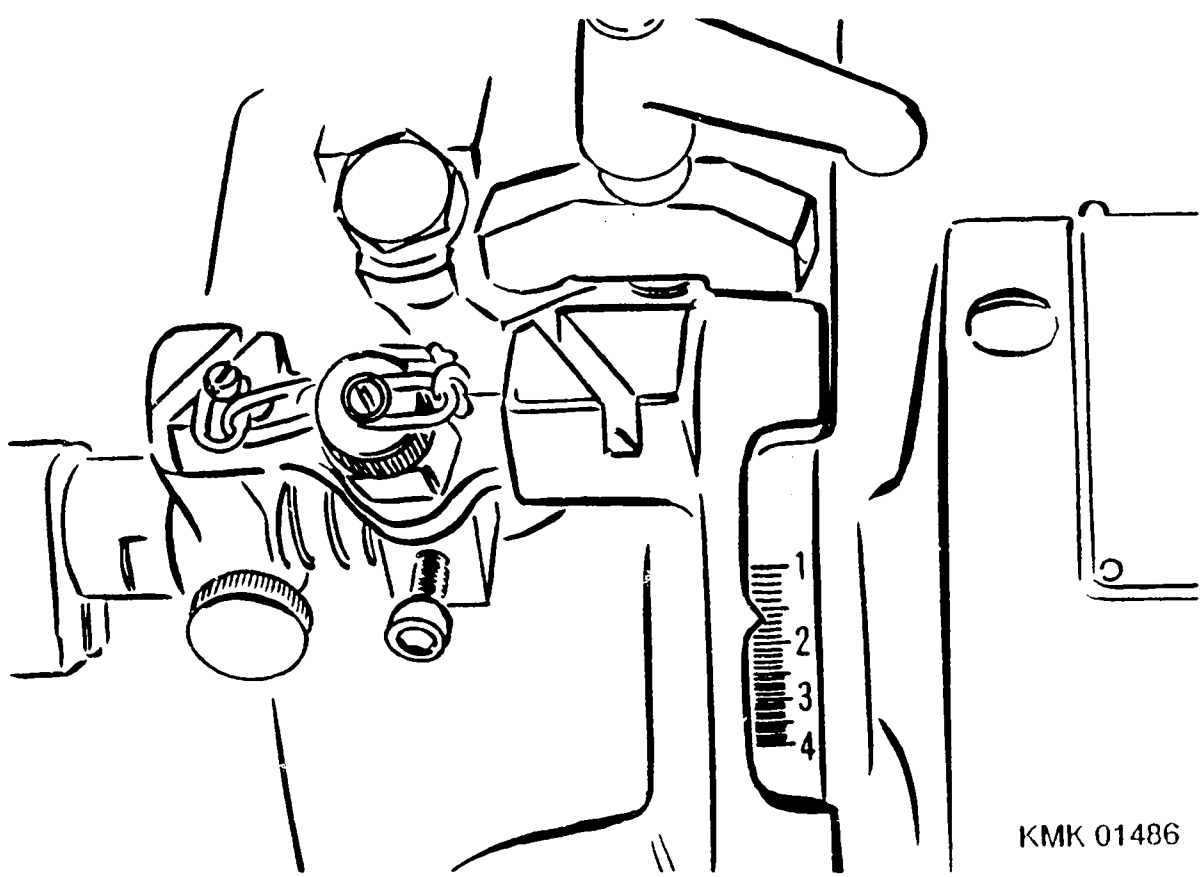
Turn drive shaft of injection-pump test bench until flow of calibrating oil at overflow pipe of calibrating nozzle-holder assembly turns to droplets.

Read off prestroke at measurement plate of driving device and compare to prestroke prescribed in test specifications.

Example: Desired prestroke = 2.1 mm
Actual prestroke = 1.6 mm

Shim thickness = Difference = 0.5 mm

Continue: A23/1 Fig.: A22/2



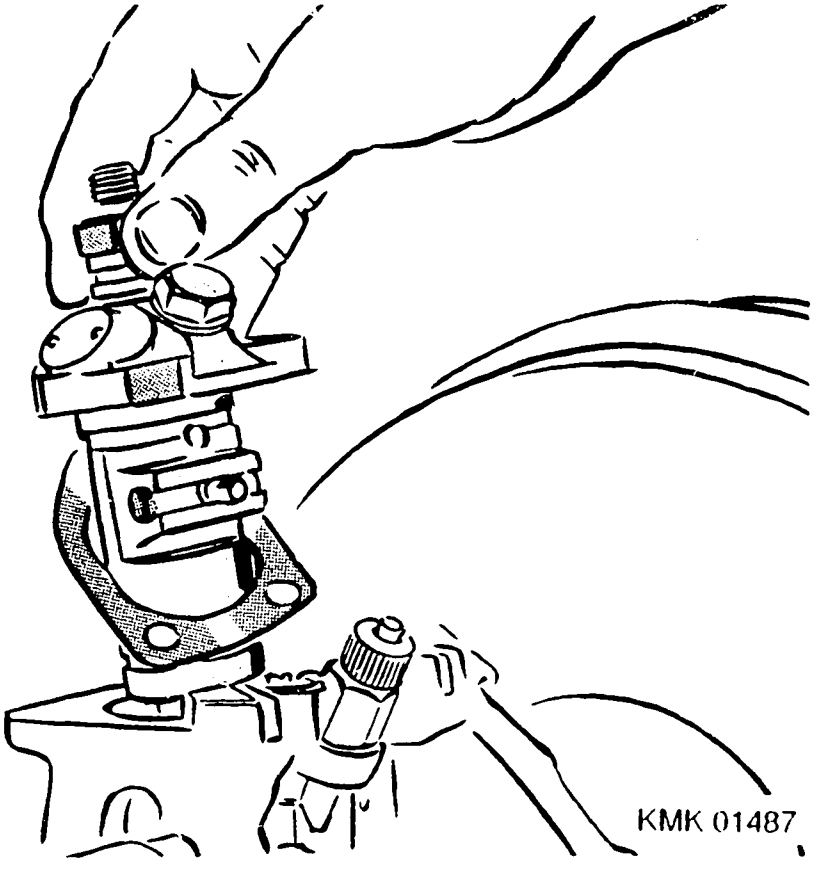
Shut off high pressure and switch off test bench.

Unscrew test-pressure line from fuel-injection pump and remove pump from driving device.

Fit determined prestroke shim and install pump in driving device again.

Make all connections again.

Continue: A24/1 Fig.: A23/2



Check prestroke setting again and repeat adjustment if necessary.

Note down prestroke determined.

Remove dummy plug from return hole of pump and connect up return hose with any restrictor prescribed to fuel-injection pump.

Switch on test bench.

Set prescribed inlet pressure.

Continue: A25/1

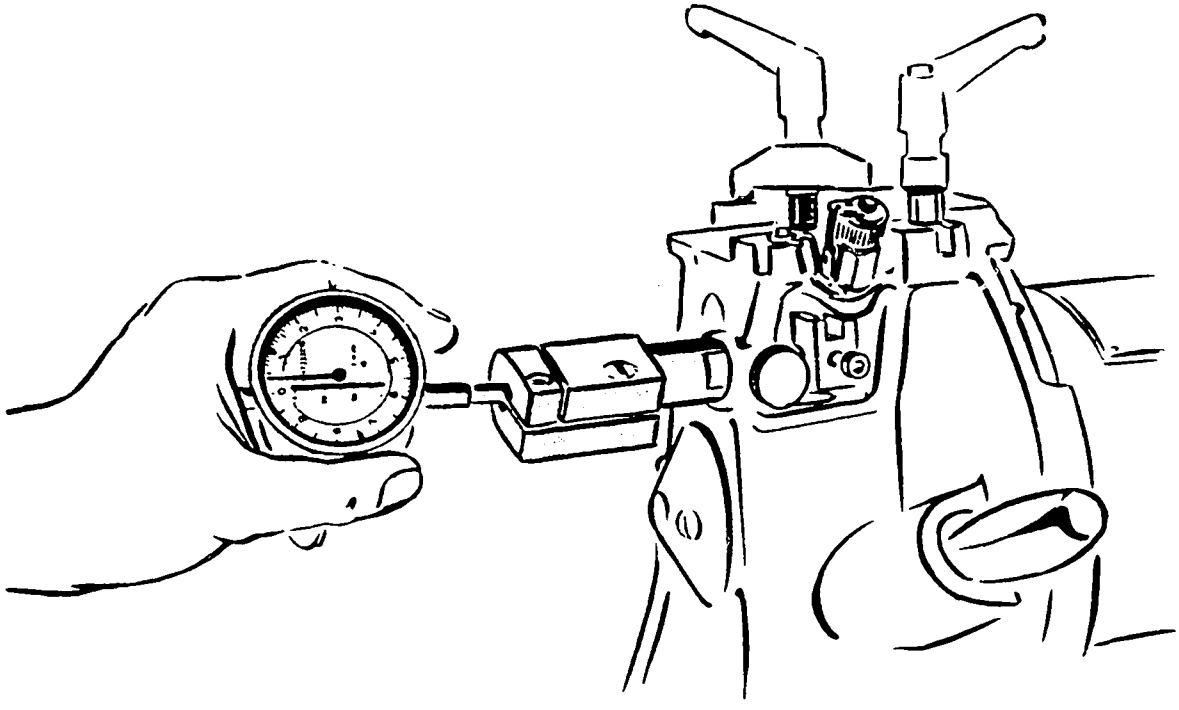
Set prescribed control-rod travel.

The data given in the test specifications refer to the blocked position of the control rod.

"+" signifies movement of the control rod in the direction of more delivery, whereas "–" signifies less delivery.

Tighten control-rod blocking screw of driving device in this position.

Continue: A26/1 Fig.: A25/2

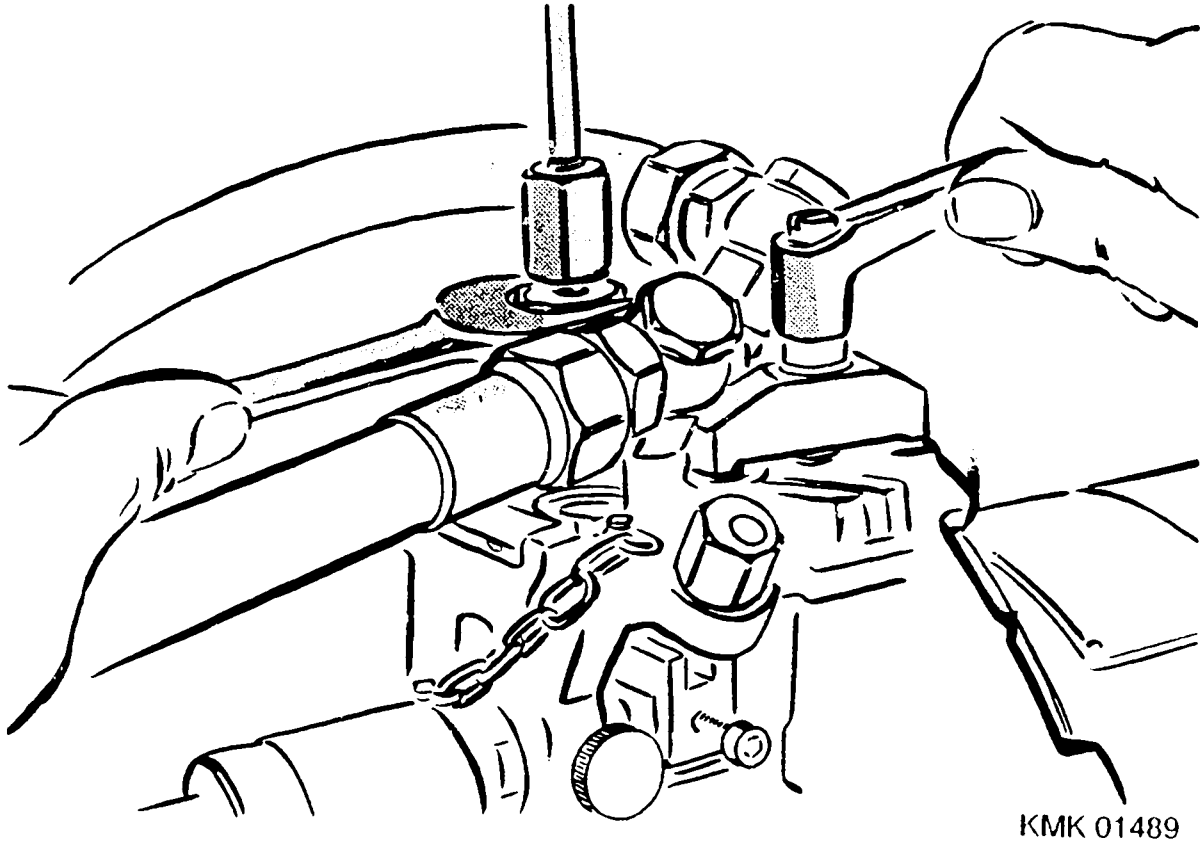


KMK 01488

Operate fuel-injection pump at setting-point speed and measure delivery.

If the measured delivery does not coincide with the prescribed delivery, loosen clamping claws of driving device slightly and turn fuel-injection pump in adjustment range of fastening hole until the prescribed delivery is obtained with renewed delivery measurement.

Continue: A27/1 Fig.: A26/2

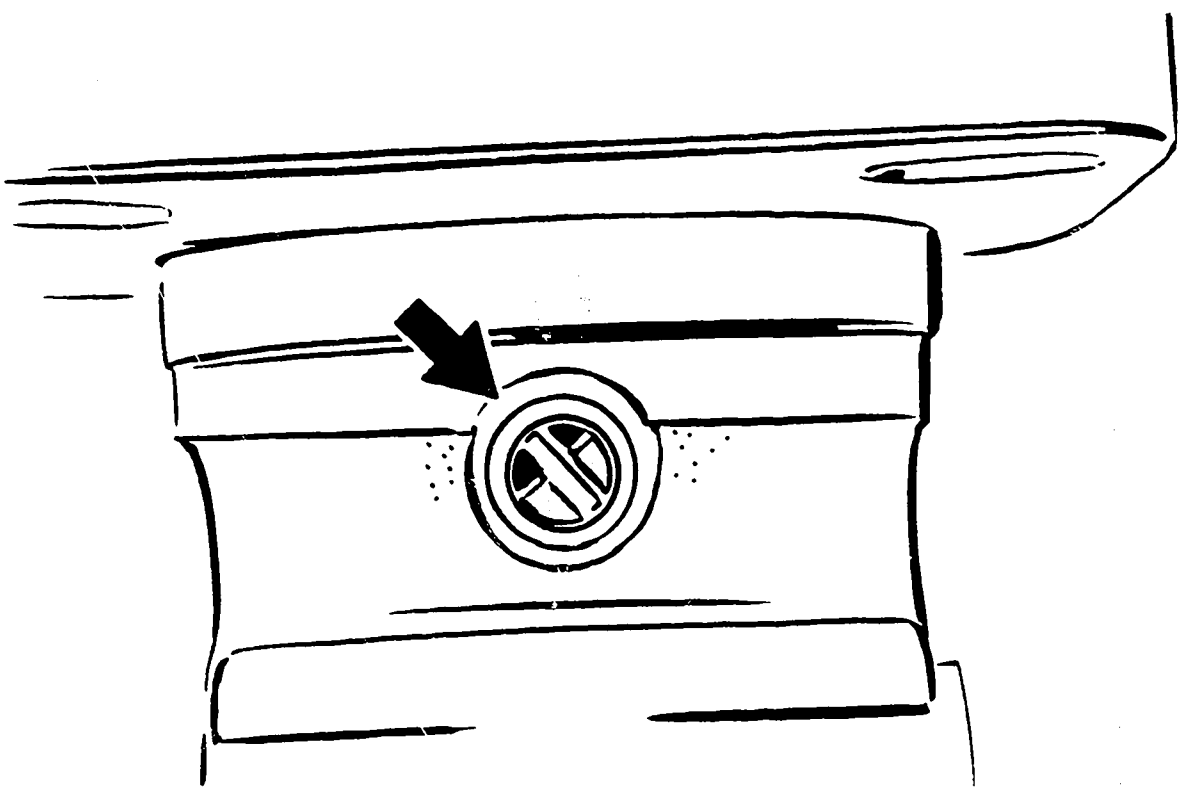


KMK 01489

If the adjustment range within the fastening hole is not sufficient, perform correction at eccentric screw (arrow).

To do so, loosen delivery-valve holder and turn eccentric screw.

Continue: A28/1 Fig.: A27/2



KMK 01490

Operate fuel-injection pump at other indicated speeds and perform delivery measurements.

If the prescribed quantities are not attained, the fault is to be found at the pump barrel and/or delivery-valve assembly.

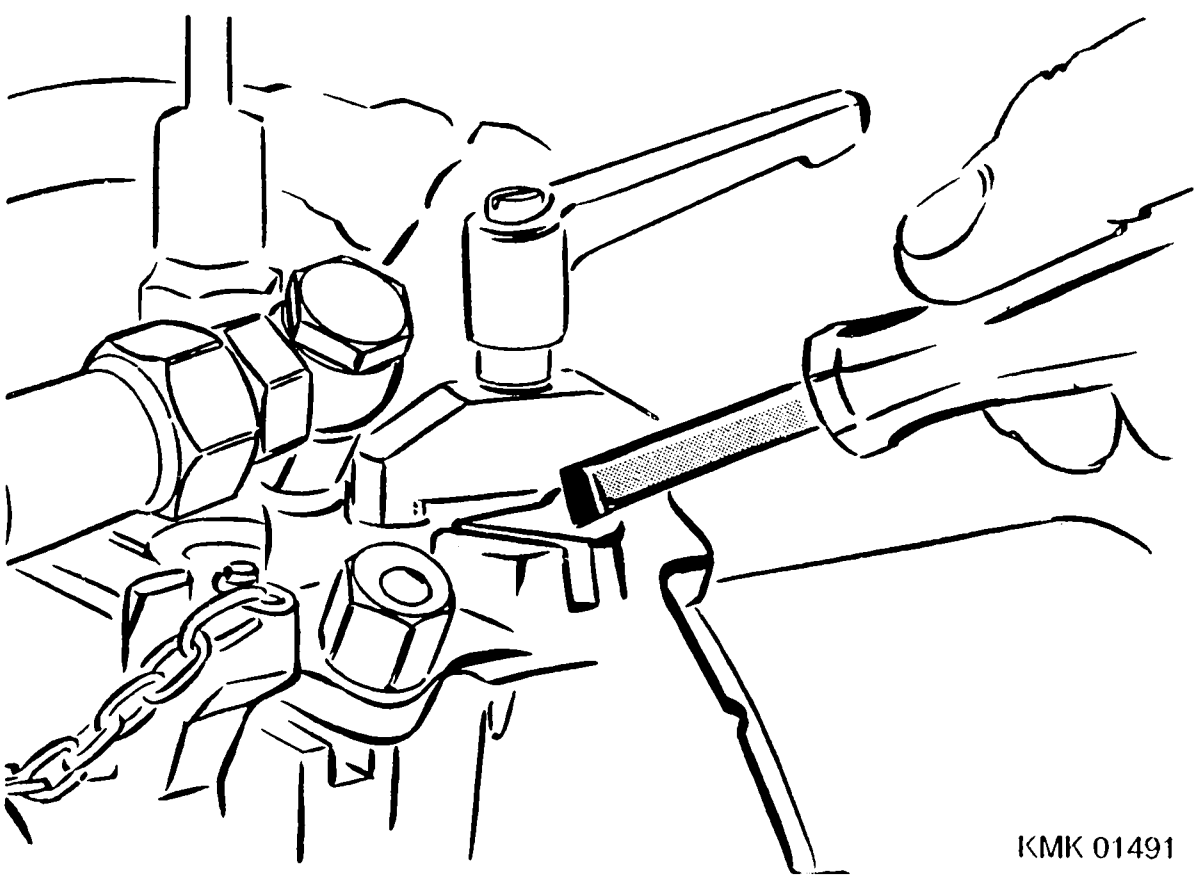
Where necessary, replace these components and start pump adjustment procedure again.

Switch off pump test bench.

Continue: B01/1

Do not remove fuel-injection pump from driving device, but rather make mark at flange of fuel-injection pump with appropriate marking tool 1 687 959 014.

Continue: B02/1 Fig.: B01/2



KMK 01491

Move control rod to "0" position and set with setting mandrel of driving device.

Loosen test-pressure line and unscrew it from delivery-valve holder.

Remove calibrating-oil inlet and discharge hose.

Loosen fastening claws and remove fuel-injection pump from driving device.

Empty pump suction gallery.

Continue: B03/1

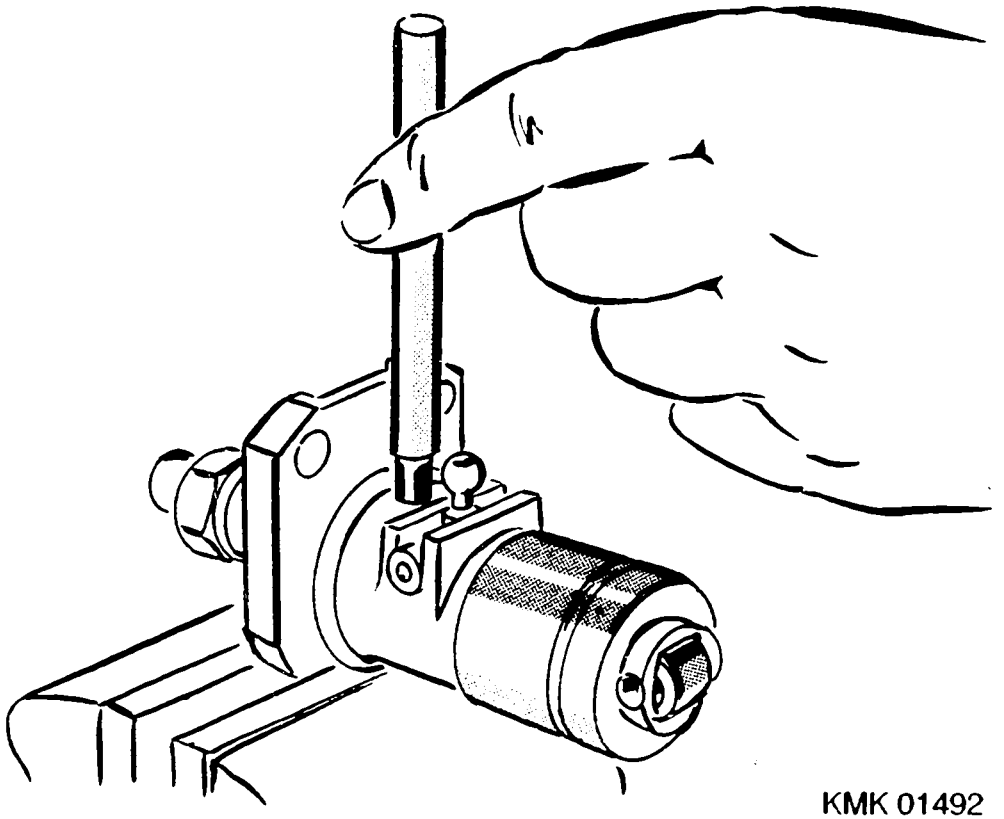
Seal delivery-valve holder with locking compound and eccentric adjusting screw with closure plate.

To do so, use sealing mandrel KDEP 1637.

Mark determined thickness of prestroke shims at point provided for this purpose on flange of fuel-injection pump.

If a figure has already been marked at this location, and if it does not coincide with the dimension to be marked, remove the old dimension from the housing flange.

Continue: N27/1 Fig.: B03/2



KMK 01492

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Continue: N28/2

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